

PROCEEDINGS OF LEARNED SOCIETIES.

ROYAL SOCIETY.

March 2, 1865.—Major-General Sabine, President, in the Chair.

“On the Marsupial Pouches, Mammary Glands, and Mammary Fœtus of the *Echidna hystrix*.” By Professor Owen, F.R.S.

In a communication to the Royal Society on the generative economy of the Monotremata*, Prof. Owen showed that the ovum left the ovarium with a spherical vitellus $1\frac{1}{2}$ line in diameter, and attained a diameter of $3\frac{1}{2}$ lines in the uterus, the increase of size being due to increase of fluid between the chorion and vitelline tunics. This fluid, homologous with the albumen of the egg of oviparous vertebrates, did not coagulate in alcohol, and the only change presented by the vitellus of the largest observed ovum was a separation from the “food-yolk” of a “germ-yolk” in the form of a stratum of very minute granules, adhering to part of the membrana vitelli. There was no trace of decidua in such impregnated uteri; the smooth chorion was firmer than that of uterine ova of Rodentia; whence, and for other reasons given in the Paper above cited, it was inferred “that the *Monotremata* were essentially ovo-viviparous.”

The impregnated uteri of the *Ornithorhynchus* there described were of females killed in the month of October. In the early part of December 1833, young *Ornithorhynchi*, obtained from the nest, were transmitted by Dr. George Bennett, F.L.S., of Sydney, N.S.W., to Prof. Owen: they were naked, blind, with short, broad, flexible, and softly labiate mandibles, the tongue proportionally large, and reaching to near the end of the mandibles; the mouth not round, as in the mammary fœtus of Marsupials, but a wide transverse slit; a pair of small patulous nostrils opened upon the upper mandible, and between them was a small prominence resembling the knob on the beak of the newly-hatched chick, but softer, and lacking the cuticle, which had been torn off. There was no trace of navel or umbilical cicatrix.

The phases of the development of the mammary glands of the *Ornithorhynchus* were the subject of another communication, and, with the peculiar formation of the mouth of the young animal, demonstrated that it was nourished by milk as other mammals. The smallest of the young of the *Ornithorhynchus* so obtained did not exceed two inches in length.

At the early part of the present year (1865), Prof. Owen received from Dr. Mueller, F.R.S., of the Botanical Gardens, Melbourne, Australia, a female *Echidna* (*Ornithorhynchus Hystrix*, Home, *Echidna Hystrix*, Cuv.), with a young one, which the captor found adhering to the mother, as he supposed, by a nipple. They were transmitted in spirits, and their description forms the chief subject of the present communication. In regard to the parent, the description is limited to the parts concerned in generation.

* “On the Ova of the *Ornithorhynchus paradoxus*,” Philosophical Transactions, vol. cxxiv. p. 555.

The marsupial pouches are two in number, about $1\frac{1}{2}$ inch apart, each with the aperture longitudinal and towards the medial line, on the ventral integument, half an inch in depth and two-thirds of an inch in length. The young *Echidna*, about one inch in length in a straight line, could be received in a bent posture into the pouch, and might cling to the fine hairs of that part by its claws; but there was no trace of nipple. Each mammary gland terminates by numerous ducts upon the fundus of the corresponding pouch.

The left ovarium, as in the *Ornithorhynchus paradoxus*, was of an oblong flattened form, developed from the posterior division of the ovarian ligament and corresponding wall of the ovarian capsule; it consisted of a rather lax stroma, invested by a smooth, thin, firm "tunica propria," which glistens where stretched over the enlarged ovisacs. Of these there were five, of a spherical form, most of them suspended by a contracted part of their periphery, not stretched into a pedicle, to the rest of the ovarium—the largest with a diameter of $1\frac{1}{2}$ line, the least of the five with a diameter of rather less than 1 line. Besides these there was a flattened ovisac, $2\frac{1}{2}$ lines in length, and 2 lines in opposite diameters, of a flattened pyriform shape, with a somewhat wrinkled exterior, attached by the base, with the apex slightly tumid, and showing a trace of a fine cicatrix. This was an ovisac from which an ovarian ovum had been discharged.

The oviducal branch of the ovarian ligament passes, as in the *Ornithorhynchus*, to the outer angle of the wide oviducal slit or aperture, which occupies or forms the margin of the ovarian pouch opposite to that to which the ovary is attached. The ligament spreads upon the inner wall of the infundibular part of the oviduct, and rejoins the ovarian division of the ligament to be continued along the oviduct, puckering up its short convolutions into a small compass. The "fallopian" aperture of the infundibulum is a longitudinal slit of 9 lines in length, with a delicate membranous border extending about a line beyond where the muscular and mucous tunics of the oviduct make the thin wall of the infundibulum opaque, its transparency against a dark ground contrasting with the opaque beginning of the proper tunics of the oviduct, which nevertheless are here very thin. No part of this delicate free margin is produced into fimbriæ; in this respect *Echidna* accords with *Ornithorhynchus*, and equally manifests the character by which the Monotremes differ from the Marsupials. The infundibular dilatation suddenly contracts about an inch from the opening into a "fallopian" tube, about a line in diameter, which is puckered up into four or five short close coils. The oviduct, after a slight contraction, suddenly expands into the uterus. This is about 2 inches long, and 6 lines in diameter. It commences by a short well-marked bend, convex outwards, and then proceeds nearly straight, the pair converging to the urogenital compartment, slightly contracting at its termination, which projects, as an "os tincæ," into the side of the fundus of that division of the cloaca.

The tunics of the uterus are, externally, the peritoneum, which is attached by a lax cellulosity to the "tunica propria;" this,

with its fibrous or muscular layer, is thin, not exceeding $\frac{1}{8}$ th of a line in the present specimen. The inner layer of the uterine wall is the thickest, and chiefly composes it, consisting of fine lamellæ stretched transversely between the fibrous layer and the fine smooth lining membrane, the whole being of a pulpy consistence, and doubtless in the recent animal highly vascular, especially in the impregnated state. The lining membrane was devoid of any trace of vascular connexion with the membranes of an ovum or fœtus, and was thrown into delicate irregular rugæ, which assumed the longitudinal direction at the "cervix" or contracted terminal part of the uterus. The orifice on the "os tincæ" was a puckered slit, about a line in extent; below it, on a produced or papillose part of the prominence, was the small circular orifice of the ureter.

The right ovarium was proportionally more developed and larger than in the *Ornithorhynchus paradoxus*: three ovisacs were developed and attached, as in the left ovarium; and there was also a compressed ovisac, similar in size and shape to that in the left side, and exhibiting an apical cicatrix, whence it is to be inferred that, in this instance, the right as well as the left ovarium had furnished an impregnated ovum; and the near equality of size and close similarity of structure and condition of the right oviduct and uterus equally indicated that they had participated in the functions of the last season of generation.

The urinary bladder opened into the middle of the fundus of the urogenital compartment, the uterine orifices intervening between the vesical one and the ureters, as in the *Ornithorhynchus paradoxus*. The urogenital canal is 1 inch 4 lines in length, and about 9 lines in diameter; its inner surface shows by some coarse wavy longitudinal rugæ its capacity for dilatation. The rectum was here of great width; it terminated by a contracted puckered aperture in the back part of the beginning of the vestibule, behind the aperture of communication of the urogenital with the vestibular canal. The distal half of the vestibule is lined by a denser and less vascular epithelium than the proximal one. The author concludes, from these appearances, that the present *Echidna* had produced two young, of which only one was secured, and that probably she had a mammary fœtus in each pouch prior to her capture.

The one which was secured resembled the young of the *Ornithorhynchus* in the general shape and curvature of the body, and also resembled the new-born young of the Kangaroo in the proportions of the limbs to the body, in the inferior size of the hind pair, in the degree of development of the digits, especially of the fore pair, and in the feeble indication of eyes or eyelids. But the mouth is proportionally wider, and has the form of a transverse slit; it is not circular. Upon the upper lip, in the mid line between the two nostrils, is a small protuberance corresponding to that in the young of the *Ornithorhynchus paradoxus*, which had been covered by some epidermal production. The traces of ears are less conspicuous than in the young Kangaroo, the conch being little, if at all, developed in the mature *Echidna*.

The tail is much shorter than in the young Kangaroo, and shows as much proportional size as in the full-grown Echidna, in which it is a mere stump concealed by the quills and hair.

The head is proportionally longer and more slender in the marsupial foetus of the Echidna than in that of the Ornithorhynchus or of the Kangaroo, and already at this early period foreshows the characteristic elongation and attenuation of that part in the mature animal. The form of the mouth, as a transverse slit, is a good monotrematous character of the young at that period, since, in all true or teated marsupials, the mouth of the mammary foetus has a peculiar circular and tubular shape. A scarcely visible linear cicatrix at the middle of the lower part of the abdomen is the sole trace of umbilicus.

A bifid obtuse rudiment of penis or clitoris projects from the fore part of the single urogenital or cloacal aperture, and in advance of the base of the tail-stump.

The brain, of which the largest part was the mesencephalon, chiefly consisting of a vesicular condition of the optic lobes, had collapsed at this part, leaving a well-defined elliptical fossa of the integument, indicative of the widely open fontanelle at the upper part of the cranium.

The skin of the shrunken body showed folds, indicative of the originally plump, well-filled abdomen.

The fore limbs, in their shortness and breadth, foreshow the characteristics of those of the parent, which may be said, indeed, to retain in this respect the embryonic character, with superinduced breadth and strength. The digits have already something of the adult proportions, the first or innermost of the five being the shortest; the others of nearly equal length, but graduating shorter from the third to the fifth. The characteristic disposition of the digits was better marked in the hind limb, the second already being the strongest and longest, the rest more rapidly shortening to the fifth than in the fore leg. The innermost, agreeably with the law of closer retention of type in the embryo, though the shortest of the five, was less disproportionately so than in the adult.

The chief points, in the generative economy of the Monotremes, which still remain to be determined by actual observation are :—

1. The manner of copulation.
2. The season of copulation.
3. The period of gestation.
4. The nature and succession of the temporary structures for the nourishment and respiration of the foetus prior to birth or exclusion.
5. The size, condition, and powers of the young at the time of birth or exclusion.
6. The period during which the young requires the lacteal nourishment.
7. The age at which the animal attains its full size.

In respect to the second point: as the female Echidna with the young was captured on the 12th of August, she might be impregnated at the latter end of June or in July. Females, therefore, killed in the last week of July and the first week in August, in the pro-

vince of Victoria, would be most likely to afford the capital facts noted under the "fourth" head, viz. the impregnated ovum *in utero*, showing some stage of embryonal development in the spiny terrestrial Monotreme. As to the hairy and aquatic *Ornithorhynchus*, the impregnated females in which ova were found in the uterus, of small size, and prior to the formation of the embryo, were caught on the 6th and 7th of October. Young *Ornithorhynchi*, measuring in length in a straight line $1\frac{7}{8}$ inch, were found in the nest on the 8th of December. The period of impregnation, therefore, in this species, in the locality of the Murrumbidgee River, is probably the latter end of September or beginning of October. Females captured in the latter half of October and in the month of November, would be most likely to have ova *in utero*, exhibiting stages of embryonal development.

Professor Owen earnestly requests anyone who may obtain females of the Platypus or Duck-mole (*Ornithorhynchus*) in October and November, or females of the Porcupine-Anteater (*Echidna*) in July and the first week of August, to preserve the specimens in colourless spirits, the belly being slit open to allow access of the preserving liquor to the interior,—or, to preserve the hinder half of the specimen, the trunk being divided behind the fore limbs—or, at least, the female organs of generation, with the bladder and rectum, preserved in strong colourless spirits. These specimens may be directed to Professor Owen, care of Dr. Mueller, F.R.S., Botanic Garden, Melbourne; or to the care of Dr. George Bennett, F.L.S., Sydney; or they may be transmitted directly, addressed "To the Principal Librarian, British Museum, London," to whom the Bill of Lading should be directed, and the freight will be paid in London.

ZOOLOGICAL SOCIETY.

Nov. 8, 1864.—Prof. Huxley, F.R.S., V.P., in the Chair.

NOTES ON THE ZOOLOGY OF SPITSBERGEN. BY ALFRED NEWTON, M.A., F.L.S., F.Z.S.

In the month of May last, Mr. Edward Birkbeck offered me a berth in his yacht, the 'Sultana,' R. T. Y. C., on a voyage to Spitsbergen. As this was a country I had long been desirous to visit, I was very glad of the opportunity of seeing it, which had so unexpectedly presented itself. On the 31st of May I found myself on board the vessel at Lowestoft, and the following morning we sailed northward. After a passage protracted by some tedious calms, we cast anchor in the Bay of Hammerfest on the evening of the 26th June. Here it was necessary to stay for some days, while a Norwegian "*jægt*" was being equipped to accompany us, and to take us, if necessary, into the ice, where the yacht, from her extreme length, would become embarrassed, and from her slight build dangerous. Late in the evening of the 2nd July the necessary preparations were completed, and the 'Semmline,' a sloop of some thirty or forty tons, got under way. The next morning the 'Sultana' fol-